In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
def slow_release_df(N_0,time):
    df=pd.DataFrame({
        "Time (Hours)":[0],
        "N_t":[N_0]})
    for i in np.arange(1,time+1):
        N_0-=0.1*N_0
        N_0+=10*np.power(0.4,i)
        x={"Time (Hours)":i,"N_t":N_0,}
        df=df.append(x,ignore_index=True)
    return df
```

In [3]:
```
df=slow_release_df(0,24)
df
```

Out[3]:

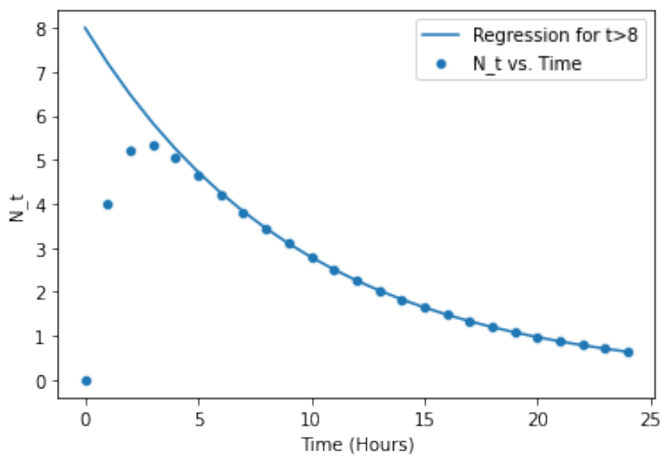
	Time (Hours)	N_t
0	0.0	0.000000
1	1.0	4.000000
2	2.0	5.200000
3	3.0	5.320000
4	4.0	5.044000
5	5.0	4.642000
6	6.0	4.218760
7	7.0	3.813268
8	8.0	3.438495
9	9.0	3.097267
10	10.0	2.788589
11	11.0	2.510149
12	12.0	2.259302
13	13.0	2.033439
14	14.0	1.830122
15	15.0	1.647120
16	16.0	1.482413
17	17.0	1.334173
18	18.0	1.200757
19	19.0	1.080681
20	20.0	0.972613
21	21.0	0.875352
22	22.0	0.787817
23	23.0	0.709035
24	24.0	0.638132

In [4]:
```
df.sort_values("N_t",ascending=False).head(1)
```

Out[4]:

	Time (Hours)	N_t
3	3.0	5.32

In [8]:
```
df_10=df[df["Time (Hours)"]>8]
df_exp=np.exp(np.polyfit(x=df_10["Time (Hours)"],y=np.log(df_10["N_t"]),deg=1))
sns.scatterplot(data=df,x="Time (Hours)",y="N_t",label="N_t vs. Time")
sns.lineplot(data=df,x="Time (Hours)",y=df_exp[1]*np.power(df_exp[0],df["Time (Hours)"]),label="Regression for t>8")
plt.ylabel("N_t")
plt.xlabel("Time (Hours)")
plt.savefig("Math_142_HW_2_Q_3a")
```



In [ ]: